Triple Line Receiver

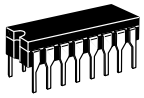
MC10116

The MC10116 is a triple differential amplifier designed for use in sensing differential signals over long lines. The base bias supply (V_{BB}) is made available at pin 11 to make the device useful as a Schmitt trigger, or in other applications where a stable reference voltage is necessary.

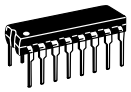
Active current sources provide the MC10116 with excellent common mode noise rejection. If any amplifier in a package is not used, one input of that amplifier must be connected to V_{BB} (pin 11) to prevent upsetting the current source bias network.

Complementary outputs are provided to allow driving twisted pair lines, to enable cascading of several amplifiers in a chain, or simply to provide complement outputs of the input logic function.

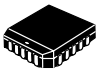
P_D = 85 mW typ/pkg (No Load)
t_{pd} = 2.0 ns typ
t_r, t_f = 2.0 ns typ (20%–80%)



L SUFFIX
CERAMIC PACKAGE
CASE 620–10

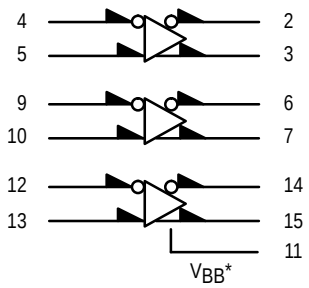


P SUFFIX
PLASTIC PACKAGE
CASE 648–08



FN SUFFIX
PLCC
CASE 775–02

LOGIC DIAGRAM

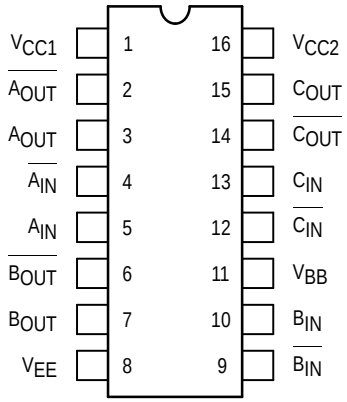


V_{CC1} = PIN 1
V_{CC2} = PIN 16
V_{EE} = PIN 8

*V_{BB} to be used to supply bias to the MC10116 only and bypassed (when used) with 0.01 μF to 0.1 μF capacitor to ground (0 V). V_{BB} can source < 1.0 mA.

When the input pin with the bubble goes positive, the output pin with the bubble goes positive.

DIP
PIN ASSIGNMENT



Pin assignment is for Dual–in–Line Package.
For PLCC pin assignment, see the Pin Conversion Tables on page 6–11 of the Motorola MECL Data Book (DL122/D).

ELECTRICAL CHARACTERISTICS

Characteristic	Symbol	Pin Under Test	Test Limits							Unit
			–30°C		+25°C			+85°C		
			Min	Max	Min	Typ	Max	Min	Max	
Power Supply Drain Current	I_E	8		23		17	21		23	mAdc
Input Current	I_{inH}	4		150			95		95	µAdc
	I_{CBO}	4		1.5			1.0		1.0	µAdc
Output Voltage Logic 1	V_{OH}	2 3	–1.060 –1.060	–0.890 –0.890	–0.960 –0.960		–0.810 –0.810	–0.890 –0.890	–0.700 –0.700	Vdc
Output Voltage Logic 0	V_{OL}	2 3	–1.890 –1.890	–1.675 –1.675	–1.850 –1.850		–1.650 –1.650	–1.825 –1.825	–1.615 –1.615	Vdc
Threshold Voltage Logic 1	V_{OHA}	2 3	–1.080 –1.080		–0.980 –0.980			–0.910 –0.910		Vdc
Threshold Voltage Logic 0	V_{OLA}	2 3		–1.655 –1.655			–1.630 –1.630		–1.595 –1.595	Vdc
Reference Voltage	V_{BB}	11	–1.420	–1.280	–1.350		–1.230	–1.295	–1.150	Vdc
Switching Times (50Ω Load)										ns
Propagation Delay	t_{4+2+} t_{4-2-} t_{4+3-} t_{4-3+}	2 2 3 3	1.0 1.0 1.0 1.0	3.1 3.1 3.1 3.1	1.0 1.0 1.0 1.0	2.0 2.0 2.0 2.0	2.9 2.9 2.9 2.9	1.0 1.0 1.0 1.0	3.3 3.3 3.3 3.3	
Rise Time (20 to 80%)	t_{2+} t_{3+}	2 3	1.1 1.1	3.6 3.6	1.1 1.1	2.0 2.0	3.3 3.3	1.1 1.1	3.7 3.7	
Fall Time (20 to 80%)	t_{2-} t_{3-}	2 3	1.1 1.1	3.6 3.6	1.1 1.1	2.0 2.0	3.3 3.3	1.1 1.1	3.7 3.7	

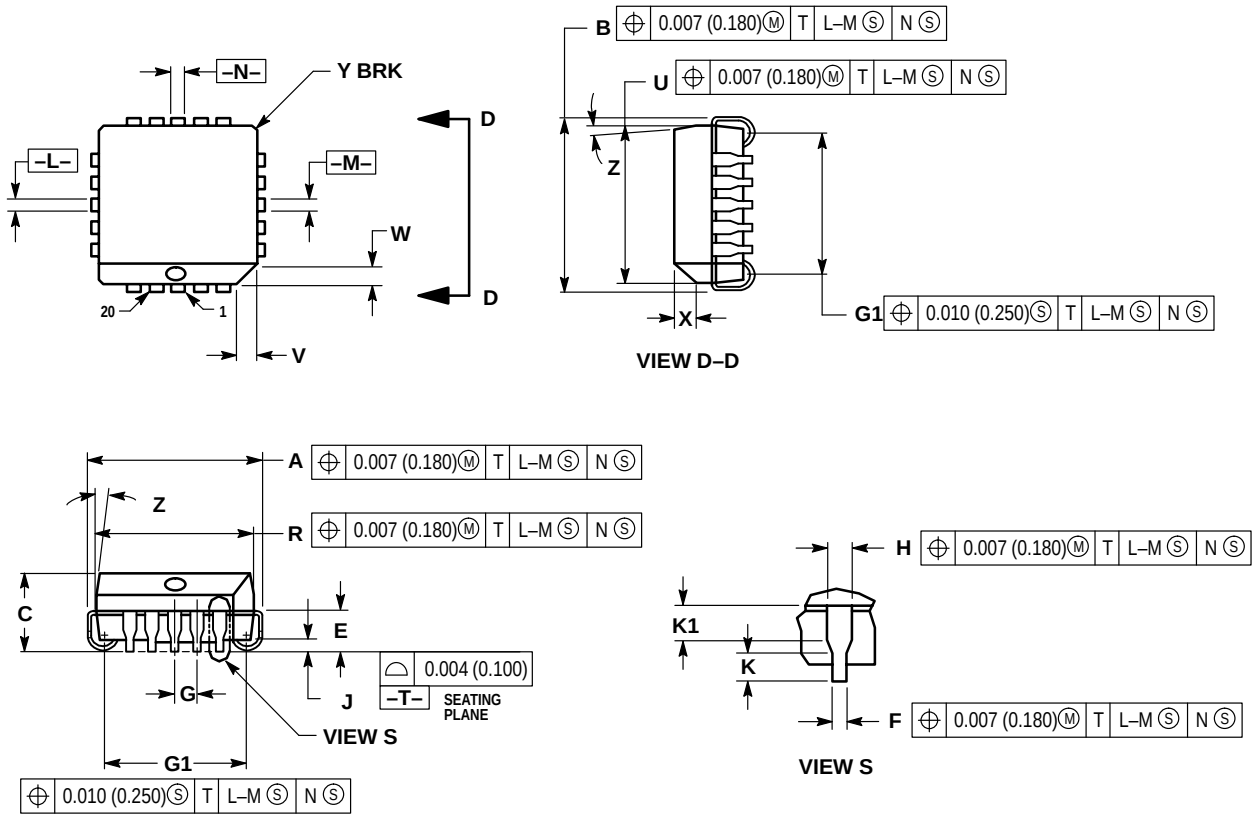
ELECTRICAL CHARACTERISTICS (continued)

@ Test Temperature			TEST VOLTAGE VALUES (Volts)						
			V_{IHmax}	V_{ILmin}	V_{IHAmin}	V_{ILAmax}	V_{BB}	V_{EE}	
–30°C			–0.890	–1.890	–1.205	–1.500	From Pin 11	–5.2	
+25°C			–0.810	–1.850	–1.105	–1.475		–5.2	
+85°C			–0.700	–1.825	–1.035	–1.440		–5.2	
Characteristic		**Symbol**	**Pin Under Test**	**TEST VOLTAGE APPLIED TO PINS LISTED BELOW**					**(V_{CC}) Gnd**
				V_{IHmax}	V_{ILmin}	V_{IHAmin}	V_{ILAmax}	V_{BB}	V_{EE}
Power Supply Drain Current		I_E	8		4, 9, 12			5, 10, 13	8	1, 16
Input Current		I_{inH}	4	4	9, 12			5, 10, 13	8	1, 16
		I_{CBO}	4		9, 12			5, 10, 13	8,4	1, 16
Output Voltage	Logic 1	V_{OH}	2 3	4 9, 12	9, 12 4			5, 10, 13 5, 10, 13	8 8	1, 16 1, 16
Output Voltage	Logic 0	V_{OL}	2 3	9, 12 4	4 9, 12			5, 10, 13 5, 10, 13	8 8	1, 16 1, 16
Threshold Voltage	Logic 1	V_{OHA}	2 3	 9, 12	9, 12	4	 4	5, 10, 13 5, 10, 13	8 8	1, 16 1, 16
Threshold Voltage	Logic 0	V_{OLA}	2 3	 9, 12	9, 12	 4	4	5, 10, 13 5, 10, 13	8 8	1, 16 1, 16
Reference Voltage		V_{BB}	11					5, 10, 13	8	1, 16
Switching Times	(50Ω Load)					**Pulse In**	**Pulse Out**		**–3.2 V**	**+2.0 V**
Propagation Delay		t_{4+2+} t_{4-2-} t_{4+3-} t_{4-3+}	2 2 3 3			4 4 4 4	2 2 3 3	5, 10, 13 5, 10, 13 5, 10, 13 5, 10, 13	8 8 8 8	1, 16 1, 16 1, 16 1, 16
Rise Time	(20 to 80%)	t_{2+} t_{3+}	2 3			4 4	2 3	5, 10, 13 5, 10, 13	8 8	1, 16 1, 16
Fall Time	(20 to 80%)	t_{2-} t_{3-}	2 3			4 4	2 3	5, 10, 13 5, 10, 13	8 8	1, 16 1, 16

Each MECL 10,000 series circuit has been designed to meet the dc specifications shown in the test table, after thermal equilibrium has been established. The circuit is in a test socket or mounted on a printed circuit board and transverse air flow greater than 500 linear fpm is maintained. Outputs are terminated through a 50-ohm resistor to –2.0 volts. Test procedures are shown for only one gate. The other gates are tested in the same manner.

OUTLINE DIMENSIONS

FN SUFFIX
PLASTIC PLCC PACKAGE
CASE 775–02
ISSUE C

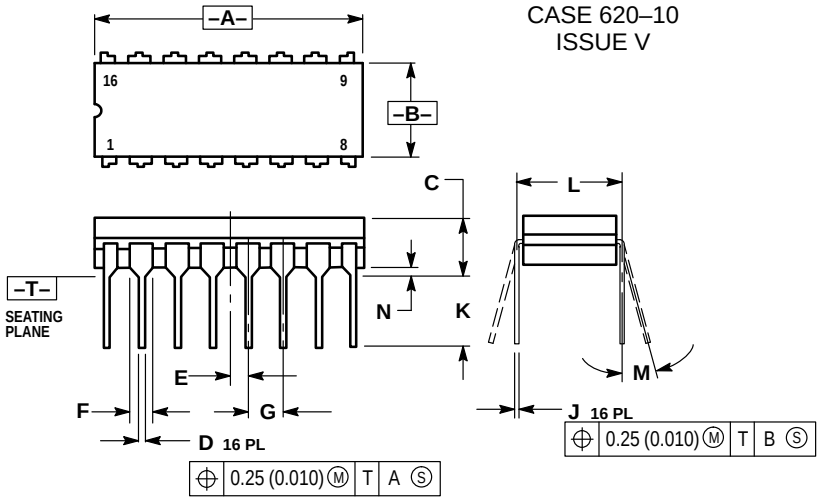


NOTES:
1. DATUMS –L–, –M–, AND –N– DETERMINED WHERE TOP OF LEAD SHOULDER EXITS PLASTIC BODY AT MOLD PARTING LINE.
2. DIMENSION G1, TRUE POSITION TO BE MEASURED AT DATUM –T–, SEATING PLANE.
3. DIMENSIONS R AND U DO NOT INCLUDE MOLD FLASH. ALLOWABLE MOLD FLASH IS 0.010 (0.250) PER SIDE.
4. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
5. CONTROLLING DIMENSION: INCH.
6. THE PACKAGE TOP MAY BE SMALLER THAN THE PACKAGE BOTTOM BY UP TO 0.012 (0.300). DIMENSIONS R AND U ARE DETERMINED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY EXCLUSIVE OF MOLD FLASH, TIE BAR BURRS, GATE BURRS AND INTERLEAD FLASH, BUT INCLUDING ANY MISMATCH BETWEEN THE TOP AND BOTTOM OF THE PLASTIC BODY.
7. DIMENSION H DOES NOT INCLUDE DAMBAR PROTRUSION OR INTRUSION. THE DAMBAR PROTRUSION(S) SHALL NOT CAUSE THE H DIMENSION TO BE GREATER THAN 0.037 (0.940). THE DAMBAR INTRUSION(S) SHALL NOT CAUSE THE H DIMENSION TO BE SMALLER THAN 0.025 (0.635).

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.385	0.395	9.78	10.03
B	0.385	0.395	9.78	10.03
C	0.165	0.180	4.20	4.57
E	0.090	0.110	2.29	2.79
F	0.013	0.019	0.33	0.48
G	0.050 BSC		1.27 BSC	
H	0.026	0.032	0.66	0.81
J	0.020	—	0.51	—
K	0.025	—	0.64	—
R	0.350	0.356	8.89	9.04
U	0.350	0.356	8.89	9.04
V	0.042	0.048	1.07	1.21
W	0.042	0.048	1.07	1.21
X	0.042	0.056	1.07	1.42
Y	—	0.020	—	0.50
Z	2 °	10 °	2 °	10 °
G1	0.310	0.330	7.88	8.38
K1	0.040	—	1.02	—

OUTLINE DIMENSIONS

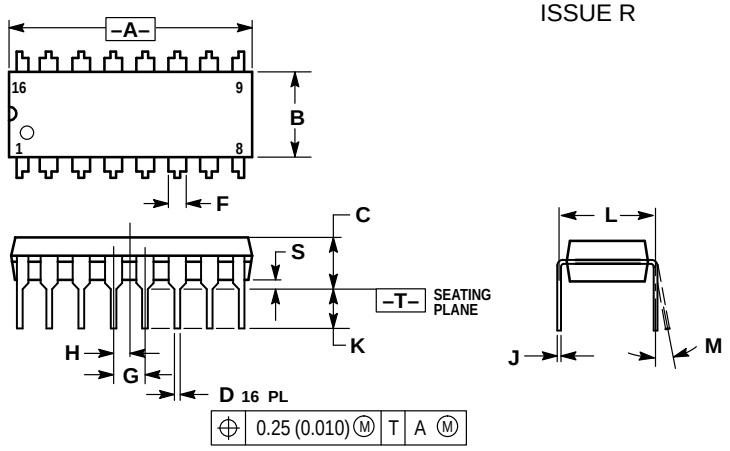
L SUFFIX
CERAMIC DIP PACKAGE
CASE 620–10
ISSUE V



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION L TO CENTER OF LEAD WHEN FORMED PARALLEL.
4. DIMENSION F MAY NARROW TO 0.76 (0.030) WHERE THE LEAD ENTERS THE CERAMIC BODY.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.750	0.785	19.05	19.93
B	0.240	0.295	6.10	7.49
C	—	0.200	—	5.08
D	0.015	0.020	0.39	0.50
E	0.050 BSC		1.27 BSC	
F	0.055	0.065	1.40	1.65
G	0.100 BSC		2.54 BSC	
H	0.008	0.015	0.21	0.38
K	0.125	0.170	3.18	4.31
L	0.300 BSC		7.62 BSC	
M	0 °	15 °	0 °	15 °
N	0.020	0.040	0.51	1.01

P SUFFIX
PLASTIC DIP PACKAGE
CASE 648–08
ISSUE R



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION L TO CENTER OF LEADS WHEN FORMED PARALLEL.
4. DIMENSION B DOES NOT INCLUDE MOLD FLASH.
5. ROUNDED CORNERS OPTIONAL.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.740	0.770	18.80	19.55
B	0.250	0.270	6.35	6.85
C	0.145	0.175	3.69	4.44
D	0.015	0.021	0.39	0.53
F	0.040	0.70	1.02	1.77
G	0.100 BSC		2.54 BSC	
H	0.050 BSC		1.27 BSC	
J	0.008	0.015	0.21	0.38
K	0.110	0.130	2.80	3.30
L	0.295	0.305	7.50	7.74
M	0 °	10 °	0 °	10 °
S	0.020	0.040	0.51	1.01

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